IN THE CLAIMS

1. [Currently Amended] A pulsed power application system for an x-ray tube comprising:

an x-ray tube having an anode and cathode, said x-ray tube configured for diagnostic imaging;

a power supply configured to provide optical energy and an anode-to-cathode gap voltage via electrical energy, said anode-to-cathode gap voltage is greater than 150kV, wherein said optical energy and said gap voltage are pulsed resulting in a pulsed x-ray radiation; and

a means for transferring said optical energy and said electrical energy from said power supply to said x-ray tube.

2. [Currently Amended] The pulsed power application system of claim 1, wherein said optical energy and said gap voltage is pulsed, said gap voltage is pulsed by pulsing an output~~the extraction~~ voltage of said power supply.

3. [Currently Amended] The pulsed power application system of claim 1, wherein the x-ray tube is bipolar and said anode is connected to a positive terminal of a first power supply of said power supply and said cathode is connected to a negative terminal of a second power supply of said power supply, remaining terminals of said first and second power suppl~~y~~ies are referenced to ground.

4. [Currently Amended] The pulsed power application system of claim 1, wherein said anode is referenced to ground potential and said cathode is connected to a negative terminal of said second power supply.

5. [Original] The pulsed power application system of claim 1, wherein said optical energy is generated by one of a laser, an LED, and an electroluminescent device in operable communication with said power supply and configured to generate pulsed photon energy at a suitable wavelength to optimize electron emission from an electron source.

6. [Original] The pulsed power application system of claim 1, wherein said cathode includes a surface configured as an electron source to generate electrons triggered by photons directed at said surface, said photons generated from said optical energy.

7. [Original] The pulsed power application system of claim 6, wherein said surface of said cathode is a photo-emitting surface including at least one of clean metals, semi-conductor crystals, coated metal materials, coated oxide materials, and cleaved crystal edges.

8. [Original] The pulsed power application system of claim 7, wherein said electron source includes a field emission array (FEA).

9. [Original] The pulsed power application system of claim 8, wherein said field emission array (FEA) includes a Spindt-type field emission array.

10. [Original] The pulsed power application system of claim 1, wherein said means for transferring said optical energy and said electrical energy from said power supply to said x-ray tube is a single cable, said single cable comprising:

a waveguide configured to transfer optical energy to the x-ray tube,

an electrical conductor configured to transfer electrical energy to the x-ray tube, said electrical conductor surrounding at least a portion of said waveguide along a length of the cable; and

an insulation material disposed between said waveguide and said electrical conductor, said insulation material surrounding said waveguide and said electrical conductor.

11. [Currently Amended] An x-ray tube adapted to generate pulsed x-ray radiation comprising:

a frame;

an anode disposed in said frame;

a cathode corresponding with said anode disposed in said frame;

a power supply configured to provide optical energy and an anode-to-cathode gap voltage via electrical energy, said anode-to-cathode gap voltage is greater than 150kV, wherein said optical energy and said gap voltage are pulsed resulting in a pulsed x-ray radiation; and

a means for transferring said optical energy and said electrical energy from said power supply to said x-ray tube, said x-ray tube configured for diagnostic imaging.

12. [Currently Amended] The x-ray tube of claim 11, wherein said optical energy and said gap voltage is pulsed, said gap voltage is pulsed by pulsing an output~~the extraction~~ voltage of said power supply.

13. [Original] The x-ray tube of claim 11, wherein said power supply includes a positive terminal in electrical communication with said anode and a negative terminal in electrical communication with said cathode, wherein said power supply generates a pulsed emission current resulting in the pulsed x-ray radiation from said anode.

14. [Currently Amended] The x-ray tube of claim 11, wherein the x-ray tube is bipolar and said anode is connected to a positive terminal of a first power supply of said power supply and said cathode is connected to a negative terminal of a second power supply of said power supply, remaining terminals of said first and second power supply are referenced to ground.

15. [Original] The x-ray tube of claim 11, wherein said optical energy is generated by one of a laser, an LED, and an electroluminescent device in operable communication with said power supply and configured to generate pulsed photon energy at a suitable wavelength to optimize electron emission from an electron source.

16. [Original] The x-ray tube of claim 11, wherein said cathode includes a surface configured as an electron source to generate electrons triggered by photons directed at said surface, said photons generated from said optical energy.

17. [Original] The x-ray tube of claim 16, wherein said surface of said cathode is a prepared photo-emitting surface including at least one of clean metals, semi-conductor crystals, coated metal materials, coated oxide materials, and cleaved crystal edges.

18. [Original] The x-ray tube of claim 17, wherein said electron source includes a field emission array (FEA).

19. [Original] The x-ray tube of claim 18, wherein said field emission array (FEA) includes a Spindt-type field emission array.

20. [Original] The pulsed power application system of claim 11, wherein said means for transferring said optical energy and said electrical energy from said power supply to said x-ray tube is a single cable, said single cable comprising:

a waveguide configured to transfer optical energy to the x-ray tube,

an electrical conductor configured to transfer electrical energy to the x-ray tube, said electrical conductor surrounding at least a portion of said waveguide along a length of the cable; and

an insulation material disposed between said waveguide and said electrical conductor, said insulation material surrounding said waveguide and said electrical conductor.

21. [Currently Amended] A method to reduce the size for improving the efficiency of operation in x-ray tubes, the method comprising:

configuring a power supply to provide optical energy and electrical energy;

connecting said power supply to an~~the~~ x-ray tube configured for diagnostic imaging with a means for transferring said optical energy and said electrical energy from said power supply to the x-ray tube, the x-ray tube having an anode and a cathode disposed in the x-ray tube to provide a gap voltage therebetween, said gap voltage is greater than 150kV;

pulsing said gap voltage; and

generating a pulsed x-ray radiation from said anode.

22. [Original] The method of claim 21, wherein said means for transferring said optical energy and said electrical energy from said power supply to said x-ray tube is a single cable, said single cable comprising:

a waveguide configured to transfer optical energy to the x-ray tube,

an electrical conductor configured to transfer electrical energy to the x-ray tube, said electrical conductor surrounding at least a portion of said waveguide along a length of the cable; and

an insulation material disposed between said waveguide and said electrical conductor, said insulation material surrounding said waveguide and said electrical conductor.

23. [Currently Amended] A pulsed power application system for an x-ray tube comprising:

an x-ray tube having an anode and cathode, said x-ray tube configured for diagnostic imaging;

a power supply configured to provide optical energy generating photons and electrical energy generating an anode-to-cathode gap voltage said anode-to-cathode gap voltage is greater than 150kV; and

a pulsing means for pulsing said photons and said gap voltage resulting in a pulsed x-ray radiation;

a means for transferring said optical energy and said electrical energy from said power supply to said x-ray tube.

24. [Currently Amended] The pulsed power application system of claim 23 wherein said pulsing means includes at least one of, and includes combinations of at least one of:

pulsing an output~~the extraction~~ voltage of said power supply;

applying a grid voltage to control electron emission current; and

switching one of a switchable electron source in operable communication with the cathode.

25. [Currently Amended] A power supply cable for an x-ray tube comprising:

a waveguide configured to transfer optical energy to the x-ray tube, said x-ray tube configured for diagnostic imaging, said x-ray tube configured to generated an anode-to-cathode gap voltage greater than 150kV;

an electrical conductor configured to transfer electrical energy to the x-ray tube, said electrical conductor surrounding at least a portion of said waveguide along a length of the cable; and

an insulation material disposed between said waveguide and said electrical conductor, said insulation material surrounding said waveguide and said electrical conductor.

26. [Original] The cable of claim 25, wherein said electrical conductor includes two electrical conductors surrounding said at least a portion of said waveguide, said two electrical conductors configured to optimize a skin effect for pulsed power current transmission through said two electrical conductors.

27. [Original] The cable of claim 26, wherein each of said two electrical conductors is configured as a portion of a cylindrical wall disposed proximate a periphery of the cable to optimize said skin effect.

28. [Original] The cable of claim 25, wherein said electrical conductor is configured to use a transmission line effect of a pulse train of power to maximize voltage at the x-ray tube.

29. [Original] The cable of claim 25, wherein said waveguide includes one of an optical fiber and a bundle of optical fibers.

30. [Original] The cable of claim 25, wherein said waveguide is made from one of a plastic and a glass.

31. [Currently Amended] A method to reduce the size of a power cable supplying an x-ray tube, the method comprising:

employing an optical waveguide to transfer optical energy to an electron source triggered by photon energy to initiate release of electrons;

configuring an accelerating potential conductor taking into account skin effect to reduce the thickness thereof and circumferentially disposing about said waveguide, wherein said conductor is configured to use a transmission line effect of a pulse train of power to maximize voltage at the x-ray tube; and

disposing an insulating material between said conductor and said waveguide, said insulation material surrounding said conductor and a periphery of said waveguide.